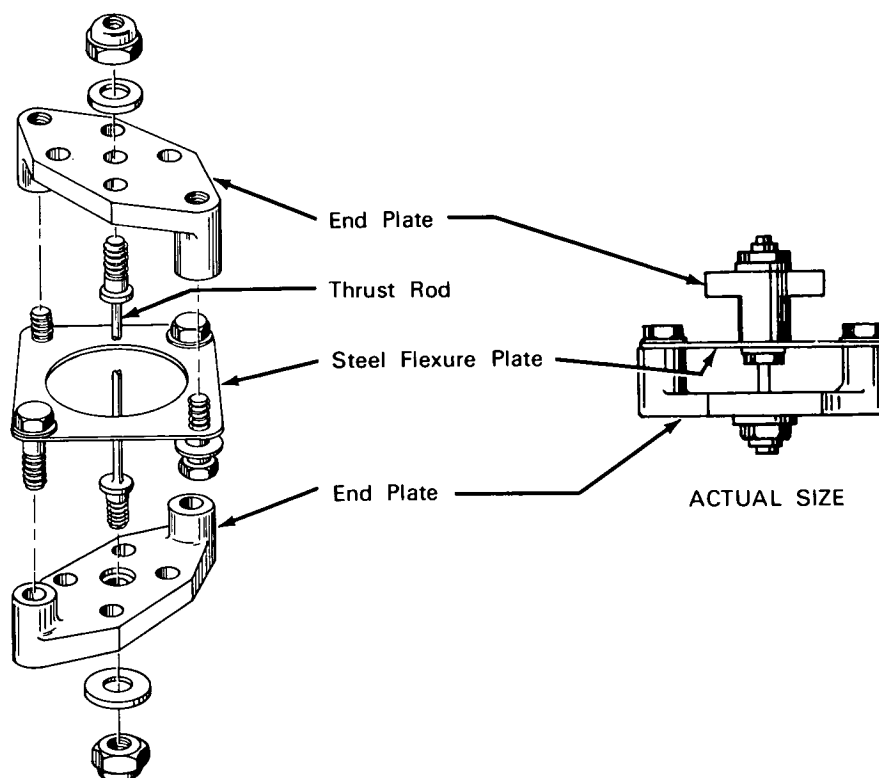


# NASA TECH BRIEF



This NASA Technical Brief is issued by the Office of Technology Utilization to acquaint industry with the technical content of an innovation derived from the NASA space program.

## Lightweight Universal Joint Transmits Both Torque and Thrust



**The problem:** A lightweight universal joint that will transmit both torque and thrust, or a combination of these two forces. Conventional universal joints are comparatively heavy and are generally not designed to transmit thrust.

**The solution:** A universal joint of unusual design which utilizes a thin steel flexure plate to transmit torque and a steel rod to transmit thrust.

**How it's done:** To meet the needs of spacecraft, this single element, elastic universal joint has been designed to reduce weight and size without sacrificing strength or reliability.

Two end pieces of the joint are bolted to a thin steel plate having a large opening at its center. Each of the end pieces is bolted to two diagonally-located corners of the square steel plate. Since the plate is flexible, this construction will provide normal universal joint action.

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A novel feature of this innovation is the flexure rod connecting the two end pieces. The rod has thrust flanges near both ends and terminates in a threaded portion. Thus, it is tightly fixed to the end pieces and will transmit thrust or a combination of thrust and torque.

Both the flexure plate and the thrust transmitting rod are independently mounted and are free to act individually. Maximum characteristics of the two members are available at all times.

**Note:**

This universal joint was developed for the mounting of small control rockets so that they can be tilted to give attitude and guidance control to a space vehicle.

**Patent Status:** NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Robert M. Bamford  
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